

**What is claimed is:**

1        1. A keyboard control apparatus with a universal  
2 serial bus (USB) interface for use in a notebook computer  
3 having a plurality of keys, comprising:  
4        a mapping unit for storing a plurality of key matrix  
5            codes corresponding to said plurality of keys;  
6        a shift register for generating a reference signal and  
7            a plurality of scan output signals in accordance  
8            with a clock signal and a start signal;  
9        a key matrix circuit coupled to said shift register to  
10            receive said plurality of scan output signals,  
11            for outputting a plurality of scan input signals  
12            and triggering one of said plurality of scan  
13            input signals when a corresponding key of said  
14            notebook computer is actuated, in which said  
15            plurality of keys are rendered by means of said  
16            plurality of scan output signals together with  
17            said plurality of scan input signals;  
18        an address generator coupled to said shift register to  
19            receive said reference signal and coupled to said  
20            key matrix circuit to receive said plurality of  
21            scan input signals, for generating an address  
22            signal in accordance with said reference signal  
23            and said triggered scan input signal;  
24        a selector separately coupled to said address generator  
25            and said mapping unit, for receiving said address  
26            signal and selecting one of said plurality of key  
27            matrix codes which is designated to said address  
28            signal; and

29       an interface converter coupled to said selector, for  
30           converting said selected key matrix code into a  
31           pair of differential signals compliant with the  
32           universal serial bus (USB) specification.

1       2. The keyboard control apparatus of claim 1 wherein  
2       said selector comprises a plurality of storage elements for  
3       storing status data so that one of said key matrix codes is  
4       selected from said mapping unit in accordance with said  
5       address signal and said status data.

1       3. The keyboard control apparatus of claim 1 further  
2       comprising a filter coupled to said key matrix circuit, for  
3       filtering noise from said scan input signals and providing  
4       respective filtered versions of said scan input signals to  
5       said address generator.

1       4. The keyboard control apparatus of claim 3 further  
2       comprising a buffer circuit coupled between said filter and  
3       said address generator, for amplifying said respective  
4       filtered versions of said scan input signals and providing  
5       respective amplified versions of said scan input signals to  
6       said address generator.

1       5. The keyboard control apparatus of claim 1 wherein  
2       said shift register sequentially triggers said scan output  
3       signals between assertions of said start signal, in which  
4       trigger phase relationships between said scan output signals  
5       are different.

1       6. The keyboard control apparatus of claim 1 wherein  
2       said key matrix circuit comprises a plurality of row lines

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3 to provide said scan input signals, respectively, and a  
4 plurality of column lines to receive said scan output  
5 signals, respectively, in which intersections of said row  
6 lines and said column lines are arranged corresponding to  
7 said keys of said notebook computer.

1       7. The keyboard control apparatus of claim 6 wherein  
2 one of said intersections is activated to trigger a related  
3 scan input signal when said corresponding key of said  
4 notebook computer is actuated.

1       8. The keyboard control apparatus of claim 1 wherein  
2 said mapping unit is formed of a non-volatile memory.

1       9. The keyboard control apparatus of claim 1 wherein  
2 said mapping unit is formed of an Electrically Erasable  
3 Programmable Read-Only Memory (EEPROM).

1       10. The keyboard control apparatus of claim 1 wherein  
2 said interface converter transmits said selected key matrix  
3 code in the form of said pair of differential USB signals to  
4 south bridge logic of said notebook computer for further  
5 processing.